On several Ramanujan equations applied to some sectors of String Theory, Supersymmetry Breaking and Particle Physics revisited: new possible mathematical connections

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Abstract

In this research thesis, we have analyzed and deepened several Ramanujan equations applied to some sectors of String Theory, Supersymmetry Breaking and Particle Physics. We describe also new possible mathematical connections

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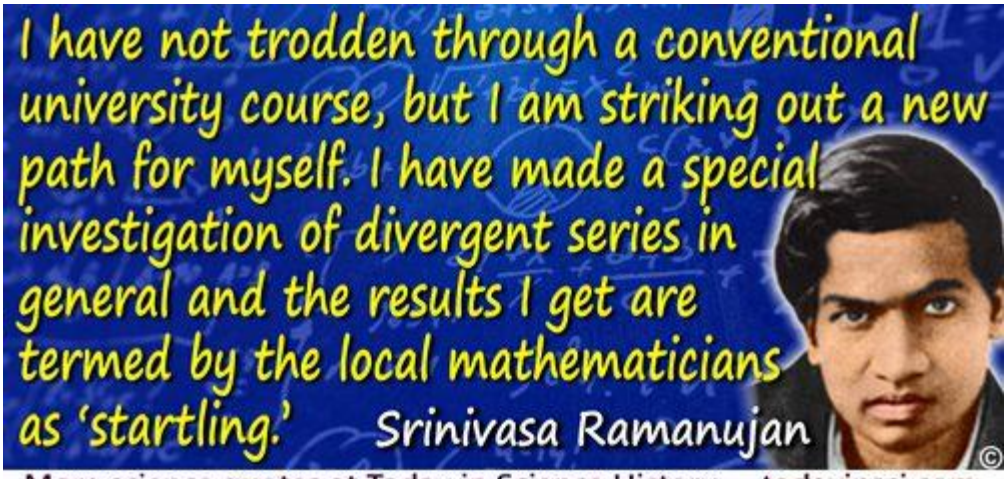

I have not trodden through a conventional university course, but I am striking out a new path for myself. I have made a special investigation of divergent series in general and the results I get are termed by the local mathematicians as 'startling.'
Srinivasa Ramanujan
More science quotes at Today in Science History
todayinsci.com

From:

Aspects of SUSY Breaking in String Theory
Augusto Sagnotti
Scuola Normale Superiore and INFN –Pisa - OKC Colloquium
Stockholm, September 2018

a. "Climbing" solution (φ climbs, then descends):

$$\dot{\varphi} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\,\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right]$$

b. "Descending" solution (φ only descends):

$$\dot{\varphi} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\,\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right]$$

$\gamma < 1$

From:

Pre – Inflationary Clues from String Theory ?
N. Kitazawa a and A. Sagnotti – https://arxiv.org/abs/1402.1418v2

For $0 < \gamma < 1$ there are actually *two* classes of such solutions, which describe respectively a scalar that emerges from the initial singularity while *climbing* or *descending* the potential. To begin with, the *climbing* solutions for the τ–derivatives of φ and $\mathcal{A}$ are

$$\begin{aligned} \dot{\varphi} &= \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\,\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right] , \\ \dot{\mathcal{A}} &= \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \sqrt{\frac{1+\gamma}{1-\gamma}}\,\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right] , \end{aligned} \tag{2.12}$$

and the reader should appreciate that these expressions *do not involve any initial–value constants* other than the Big–Bang time, here set for convenience at $\tau = 0$. On the other hand, the corresponding fields read

$$\begin{aligned} \varphi &= \varphi_0 + \frac{1}{1+\gamma}\,\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \frac{1}{1-\gamma}\,\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) , \\ \mathcal{A} &= \frac{1}{1+\gamma}\,\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \frac{1}{1-\gamma}\,\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) , \end{aligned} \tag{2.13}$$

and do involve an important *integration constant*, φ_0. This determines the value of φ at a reference "parametric time" $\tau > 0$ or, what is more interesting for us, bounds from above the largest value that it can attain during the cosmological evolution. Strictly speaking, $\mathcal{A}$ would also involve an additive constant, but one can set it to zero up to a rescaling of the spatial coordinates. On the other hand, φ_0 has interesting effects on the dynamics that become particularly pronounced in the two–exponential potentials

$$V(\varphi) = V_0\left(e^{2\varphi} + e^{2\gamma\varphi}\right) . \tag{2.14}$$

From the following Ramanujan mock theta function:

MOCK THETA ORDER 6

(https://en.wikipedia.org/wiki/Mock_modular_form#Order_6)

$$\sigma(q) = \sum_{n\geq 0} \frac{q^{(n+1)(n+2)/2}(-q;q)_n}{(q;q^2)_{n+1}}$$

That is:

(A053271 sequence OEIS)

Sum_{n >= 0} q^((n+1)(n+2)/2) (1+q)(1+q^2)...(1+q^n)/((1-q)(1-q^3)...(1-q^(2n+1)))

We have that:

sum q^((n+1)(n+2)/2) (1+q)(1+q^2)(1+q^n)))/((1-q)(1-q^3)(1-q^(2n+1))), n = 0 to k

$$\sum_{n=0}^{k} \frac{q^{1/2\,(n+1)(n+2)}\,(1+q)\,(1+q^2)\,(1+q^n)}{(1-q)\,(1-q^3)\,(1-q^{2\,n+1})}$$

:

$$\sum_{n=0}^{k} \frac{q^{1/2\,(n+1)(n+2)}\,(1+q)\,(1+q^2)\,(1+q^n)}{(1-q)\,(1-q^3)\,(1-q^{2\,n+1})}$$

For q = 0.5 and n = 2, we develop the above formula in the following way:

(((0.5^((2+1)(2+2)/2) (1+0.5)(1+0.5^2)(1+0.5^2)))/(((1-0.5)(1-0.5^3)(1-0.5^(2*2+1)))

$$\frac{0.5^{(2+1)\times(2+2)/2}\,(1+0.5)\,(1+0.5^2)\,(1+0.5^2)}{(1-0.5)\,(1-0.5^3)\,(1-0.5^{2\times2+1})}$$

0.0864055299539170506912442396313364055299539170506912442 39...
0.0864055...

1+(((0.5^((2+1)(2+2)/2) (1+0.5)(1+0.5^2)(1+0.5^2)))/(((1-0.5)(1-0.5^3)(1-0.5^(2*2+1)))

Input:

$$1+\frac{0.5^{(2+1)\times(2+2)/2}\,(1+0.5)\,(1+0.5^2)\,(1+0.5^2)}{(1-0.5)\,(1-0.5^3)\,(1-0.5^{2\times2+1})}$$

1.0864055299539170506912442396313364055299539170506912442 39...
1.0864055...

From the formula (b), for $\gamma = 0.0864055$, we obtain:

1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

Result:

−0.9724368…

-0.9724368…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)-\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(i\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=0.0867299+\sum_{k=1}^{\infty}\left(1.09048-0.917024\,(-1)^k\right)q^{2k}\quad\text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=0.545242+\sum_{k=1}^{\infty}\left(1.09048\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^{\,2}}\right)\quad\text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=-0.458512-\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-0.917024\,(-1)^k\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

for $q = 1.64564$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(0.545242\,i\pi-0.545242\sqrt{0.992534}\right)-0.458512\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

-1+exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$-1+\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

Result:

1.644380...

$1.644380\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternative representations:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

Series representations:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)\ \text{for}\ q=1.64564$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\,\sqrt{0.992534}}{(1-2\,k)^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)\right)\ \text{for}\ q=1.64564$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\,\sqrt{0.992534}}{4\,k^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)\right)\ \text{for}\ q=1.64564$$

Integral representation:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=-1+\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

-26*1/10^3-1+exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))

where 26 is the number of spacetime dimensions in bosonic string theory.

Input interpretation:

$$-26\times\frac{1}{10^3}-1+\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

Result:

1.6183804669247240046180816082519321698473248966210482843 67...

1.618380466…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

Series representations:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)\ \text{for}\ q=1.64564$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)\ \text{for}\ q=1.64564$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)\ \text{for}\ q=1.64564$$

Integral representation:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=-\frac{513}{500}+\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

(9^3-1)*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))-144-55+golden ratio^2

where $9^3 - 1$ is a Ramanujan cube, while 144 and 5 are Fibonacci numbers

Input interpretation:

$$(9^3-1)\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-144-55+\phi^2$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

1728.727...

1728.727…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternative representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$

$$-199+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)+\phi^2$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$
$$-199+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\left(-1+9^3\right)+\phi^2$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$
$$-199+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)\left(-1+9^3\right)+\phi^2$$

Series representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$
$$-199+\phi^2+728\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=-199+\phi^2+728\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=-199+\phi^2+728\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=-199+\phi^2+728\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

(9^3-1)*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))-144+golden ratio

Input interpretation:

$$(9^3-1)\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-144+\phi$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

1782.727...

1782.727…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

Series representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+728\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$
$$-144+\phi+728\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$
for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$
$$144+\phi=-144+\phi+728\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$
$$144+\phi=-144+\phi+728\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

55*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))-5-1/golden ratio

where 55 and 5 are Fibonacci numbers

Input interpretation:

$$55 \exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-5-\frac{1}{\phi}$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

139.8229...

139.8229…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$

$$-5+55 \exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$
$$-5+55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$
$$-5+55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

Series representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$
$$-5-\frac{1}{\phi}+55 \exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$
for $q = 1.64564$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$

$$-5-\frac{1}{\phi}+55\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$5-\frac{1}{\phi}=-5-\frac{1}{\phi}+55\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$5-\frac{1}{\phi}=-5-\frac{1}{\phi}+55\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

55*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))-21+1/golden ratio

where 55 and 21 are Fibonacci numbers

Input interpretation:

$$55 \exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-21+\frac{1}{\phi}$$

$\tanh(x)$ is the hyperbolic tangent function

$\coth(x)$ is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

125.0590...

125.0590…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=$$

$$-21+55 \exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=$$
$$-21+55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=$$
$$-21+55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

Series representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=$$
$$-21+\frac{1}{\phi}+55 \exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+55\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+55\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

Integral representation:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+55\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

From the formula (a), for γ = 0.0864055, we obtain:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

0.7442060…

0.7442060…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k}\quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^{\,2}}\right)\quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

for $q = 1.64564$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

and:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))^1/128

Input interpretation:

$$\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)\text{^}\,(1/128)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

0.997694557208300922071449503706720027493605707487861199312...

0.997694557208.... result very near to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))-Pi+1/golden ratio

Input interpretation:

$$\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-\pi+\frac{1}{\phi}$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

$\log_b(x)$ is the base-b logarithm

ϕ is the golden ratio

Result:

125.476...

125.476…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{\log(0.997695)}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

Integral representation:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)+11+\frac{1}{\phi}$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

$\log_b(x)$ is the base-b logarithm

ϕ is the golden ratio

Result:

139.618...

139.618…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\frac{\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{\log(0.997695)}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}+\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}+\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}+\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

27*1/2log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

From Wikipedia:

*"The fundamental group of the complex form, compact real form, or any algebraic version of E_6 is the cyclic group **Z**/3**Z**, and its outer automorphism group is the cyclic group **Z**/2**Z**. Its fundamental representation is 27-dimensional (complex), and a basis is given by the 27 lines on a cubic surface. The dual representation, which is inequivalent, is also 27-dimensional. In particle physics, E_6 plays a role in some grand unified theories".*

Input interpretation:

$$27 \times \frac{1}{2} \log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

$\log_b(x)$ is the base-b logarithm

Result:

1728.00...

1728.00….

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternative representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{2\log(0.997695)}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

Series representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=$$

$$\frac{27}{2}\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k}\right)\ \text{for}\ q=1.64564$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=$$

$$\frac{27}{2}\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q=1.64564$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=$$

$$\frac{27}{2}\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)\ \text{for}\ q=1.64564$$

Integral representation:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

27*1/2log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2)))))))+55-1/golden ratio

where 55 is a Fibonacci number

Input interpretation:

$$27\times\frac{1}{2}\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)+55-\frac{1}{\phi}$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

$\log_b(x)$ is the base-b logarithm

ϕ is the golden ratio

Result:

1782.38…

1782.38…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{2\log(0.997695)}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55+\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55+\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

Series representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

We have also, from the following calculation:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))/0.7442060

Input interpretation:

$$\frac{1}{0.7442060}\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

1.67498277857789320487202322338714791278725550966536917077 4...

1.6749827785…

Alternative representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$

$$\frac{\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$

$$\frac{i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$
$$\frac{-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

Series representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$
$$-1.34876+\sum_{k=1}^{\infty}\left(-1.23222-1.4653\,(-1)^k\right)q^{2k}\quad \text{for } q=1.64564$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$
$$-0.616109+\sum_{k=1}^{\infty}\left(-1.23222\,q^{2k}+\frac{2.9306\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\quad \text{for } q=1.64564$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$
$$-0.732649+\frac{1.23222}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-1.4653\,(-1)^k\,q^{2k}+\frac{2.46444\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)$$
$$\text{for } q=1.64564$$

Integral representation:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=$$
$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.616109\,i\pi+0.616109\sqrt{0.992534}\right)-0.732649\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

1/10^27*(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))/0.7442060

Input interpretation:

$$\frac{1}{10^{27}} \times \frac{1}{0.7442060}\,\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

$1.674983\ldots \times 10^{-27}$

1.674983…*10^{-27} result practically equal to the neutron mass

Alternative representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{i\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

Series representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}}=$$

$$-1.34876\times10^{-27}+\sum_{k=1}^{\infty}\left(-1.23222\times10^{-27}-1.4653\times10^{-27}(-1)^k\right)q^{2k}$$

for $q = 1.64564$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}}=$$

$$-6.16109\times10^{-28}+\sum_{k=1}^{\infty}\left(-1.23222\times10^{-27}\,q^{2k}+\frac{2.9306\times10^{-27}\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

for $q = 1.64564$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}}=$$

$$-7.32649\times10^{-28}+\frac{1.23222\times10^{-27}}{\sqrt{0.992534}}+$$
$$\sum_{k=1}^{\infty}\left(-1.4653\times10^{-27}(-1)^k\,q^{2k}+\frac{2.46444\times10^{-27}\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^{\,2}}\right)\quad\text{for } q = 1.64564$$

Integral representation:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}}=$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}$$
$$\left(\operatorname{csch}^2(t)\left(-6.16109\times10^{-28}\,i\pi+6.16109\times10^{-28}\sqrt{0.992534}\right)-\right.$$
$$\left.7.32649\times10^{-28}\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

From

$$\dot{\mathcal{A}} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \sqrt{\frac{1+\gamma}{1-\gamma}}\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right], \quad (2.12)$$

$$\varphi = \varphi_0 + \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right),$$

$$\mathcal{A} = \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right), \quad (2.13)$$

We obtain from the first of (2.12);

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right) + \sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

1.246532...

1.246532…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-1.00375+\sum_{k=1}^{\infty}\left(-0.917024-1.09048\,(-1)^k\right)q^{2k}\quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}+\frac{2.18097\,\sqrt{0.992534}}{(1-2k)^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)\quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-1.09048\,(-1)^k\,q^{2k}+\frac{1.83405\,\sqrt{0.992534}}{4k^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

$$\text{for } q=1.64564$$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\,\sqrt{0.992534}\right)-0.545242\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\,\sqrt{0.992534}}{2\,i\pi-2\,\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

and from (2.13):

1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) + 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$\frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)+\frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\sinh(x)$ is the hyperbolic sine function

$\log(x)$ is the natural logarithm

$\cosh(x)$ is the hyperbolic cosine function

Result:

−0.4731811...

-0.4731811…

Alternative representations:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log\left(\frac{1}{2}\left(e^{-1/2\sqrt{1-0.0864055^2}}+e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{0.913595}+\frac{\log\left(\frac{1}{2}\left(-e^{-1/2\sqrt{1-0.0864055^2}}+e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{1.08641}$$

Series representation:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1.09458\left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k-0.920467\left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}$$

Integral representations:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)}\frac{-2.01504\,t+1.09458\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(-1.09458+2.01504\,t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)}{t\left(-t+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(-1+t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)}\,dt$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$0.920467\left(\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)+1.18916\log\left(1+\frac{\sqrt{0.992534}}{2}\int_0^1\sinh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$1.09458\left(\log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\sinh(t)\,dt\right)+0.840933\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

We have also that:

(((1/((((((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))-0.4731810709136926398312))))))^2

Input interpretation:

$$\left(1 \Big/ \left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-0.4731810709136926398312\right)\right)^2$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

1.672039...

1.672039...

1/10^27 (((1/((((((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))-0.4731810709136926398312))))))^2

Input interpretation:

$$\frac{1}{10^{27}}\left(1 \Big/ \left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-0.4731810709136926398312\right)\right)^2$$

$\coth(x)$ is the hyperbolic cotangent function

$\tanh(x)$ is the hyperbolic tangent function

Result:

$1.67203942816019358767756969029453534340604458902162 39\ldots \times 10^{-27}$

1.672039428…*10^{-27} result practically equal to the proton mass

Alternative representations:

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2=$$

$$\frac{1}{10^{27}}\left(1\Big/\left(-0.47318107091369263983120000+\frac{1}{2}\left(\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2=$$

$$\frac{1}{10^{27}}\left(1\Big/\left(-0.47318107091369263983120000+\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\,\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.473181070913692639831200000\right)\right)^2=\frac{1}{10^{27}}$$

$$\left(1\Big/\left(-0.473181070913692639831200000+\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

Series representations:

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\,\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\,\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.473181070913692639831200000\right)\right)^2=$$

$$\frac{1.18916\times10^{-27}}{\left(1.61057+\sum_{k=1}^{\infty}\left(1+1.18916\,(-1)^k\right)q^{2k}\right)^2}$$

for

$q=$

1.64564

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2=\frac{1.18916\times10^{-27}}{\left(1.016+\sum_{k=1}^{\infty}\left(q^{2k}-\frac{2.37831\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)^2}$$

for

$q =$

1.64564

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2=\left(4.75662\times10^{-27}\sqrt{0.992534}^2\right)\Big/\left(2-2.22115\sqrt{0.992534}+\sum_{k=1}^{\infty}\sqrt{0.992534}\left(-2.37831\,(-1)^k\,q^{2k}+\frac{4\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)^2 \quad \text{for } q = 1.64564$$

Integral representation:

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\ \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\ \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2=4.75662\times10^{-27}\Big/\left(1.03199+\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(i\pi-\sqrt{0.992534}\right)+1.18916\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)^2$$

We have also, from the second of (2.12):

x+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$x+\frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-\frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\sinh(x)$ is the hyperbolic sine function
$\log(x)$ is the natural logarithm
$\cosh(x)$ is the hyperbolic cosine function

Result:

$x-0.734242$

Geometric figure:

line

Alternate forms:

$x-0.734242$

$3.13809\times10^{-9}\left(3.18665\times10^{8}\,x-2.33977\times10^{8}\right)$

Root:

$x\approx0.734242$

0.734242

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\mathbb{R}$ (all real numbers)

Bijectivity

bijective from its domain to $\mathbb{R}$

$\mathbb{R}$ is the set of real numbers

Derivative:

$$\frac{d}{dx}(x-0.734242)=1$$

Indefinite integral:

$$\int \left(x + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} \right) dx =$$

$$0.5\,x^2 - 0.734242\,x + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((-0.734242 + x) - (-0.734242 + x))\,dx = 0$$

0.734242+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$0.734242 + \frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right) - \frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\sinh(x)$ is the hyperbolic sine function

$\log(x)$ is the natural logarithm

$\cosh(x)$ is the hyperbolic cosine function

Result:

$3.91796\ldots \times 10^{-7}$

3.91796…*10^{-7} = φ

Alternative representations:

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$0.734242 - \frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595} + \frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$0.734242 - \frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595} + \frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$0.734242 - \frac{\log\left(\frac{1}{2}\left(e^{-1/2\sqrt{1-0.0864055^2}} + e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{0.913595} + \frac{\log\left(i\cos\left(\frac{\pi}{2} + \frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{1.08641}$$

Series representation:

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} = 0.734242 + \sum_{k=1}^{\infty} \frac{(-1)^k \left(1.09458\left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k - 0.920467\left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}$$

Integral representations:

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$0.734242 + \int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)} \left(\left(0.174111\,t - 1.09458\cosh\left(\frac{\sqrt{0.992534}}{2}\right) + (1.09458 - 0.174111\,t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right) \Big/ \left(t\left(-t + \cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right) + (-1+t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\right) dt$$

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$0.920467\left(0.797685 + \log\left(\frac{\sqrt{0.992534}}{2}\int_0^1 \cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right) - 1.18916\log\left(1 + \frac{\sqrt{0.992534}}{2}\int_0^1 \sinh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$-1.09458\left(-0.670799+\log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\sinh(t)\,dt\right)-\right.$$
$$\left.0.840933\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

[1/(((0.734242+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2)))))]^1/30-(11+5+1)*1/10^3

where 11 is a Lucas number and 5 is a Fibonacci number

Input interpretation:

$$\left(1\Big/\left(0.734242+\frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-\frac{1}{1-0.0864055}\right.\right.$$
$$\left.\left.\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)\right)\text{^}(1/30)-(11+5+1)\times\frac{1}{10^3}$$

$\sinh(x)$ is the hyperbolic sine function

$\log(x)$ is the natural logarithm

$\cosh(x)$ is the hyperbolic cosine function

Result:

1.618176597492330675952672454695510581717883715917510599300...

1.61817659749…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$
$$-\frac{17}{10^3}+\sqrt[30]{\frac{1}{0.734242-\frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}}}$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{10^3}+\sqrt[30]{\frac{1}{0.734242-\frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}}}$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{10^3}+\sqrt[30]{\frac{1}{0.734242-\frac{\log\left(\cos\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{0.913595}+\frac{\log\left(-i\cos\left(\frac{\pi}{2}-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{1.08641}}}$$

Series representation:

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{1000}+\sqrt[30]{\frac{1}{0.734242+\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.09458\left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k-0.920467\left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}}}$$

Integral representations:

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$\frac{1}{1000}\left(-17+1000\left(1\Big/\left(0.734242-1.09458\log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\sinh(t)\,dt\right)+0.920467\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)\right)\text{^}(1/30)\right)$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$\frac{1}{1000}\left(-17+1000\left(1\Big/\left(0.734242+0.920467\right.\right.\right.$$

$$\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)-1.09458$$

$$\left.\left.\left.\log\left(1+\frac{\sqrt{0.992534}}{2}\int_0^1\sinh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)\right)\text{^}(1/30)\right)$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{1000}+$$

$$\left(1\Big/\left(0.734242+\int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)}\left(\left(\left(0.174111\,t-1.09458\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.(1.09458-0.174111\,t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\Big/\right.\right.\right.$$

$$\left.\left.\left.\left(t\left(-t+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(-1+t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\right)\right)\right)$$

$$\left.\left.dt\right)\right)\text{^}(1/30)$$

Now, we have that: (**Aspects of SUSY Breaking in String Theory** *Augusto Sagnotti*)

$$V(\varphi) = V_0\left\{e^{2\varphi} + \frac{1}{2}\,e^{2\gamma\varphi} + a_1\,e^{-a_2(\varphi+a_3)^2} + \left[1 - e^{-\frac{2}{3}(\varphi+\Delta)}\right]^2\right\} - v_0$$

For $\Delta = 0.351$ $\varphi = 3.91796\ldots*10^{-7}$

and we obtain:

(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-x

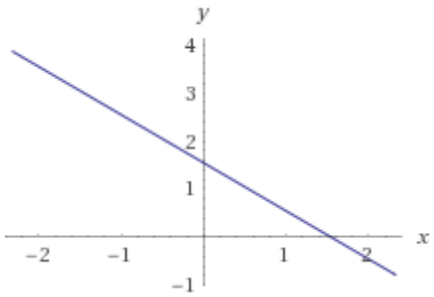
Input interpretation:

$$\left(\exp(2\times 3.91796\times 10^{-7})+\frac{1}{2}\exp(2\times 0.0864055\times 3.91796\times 10^{-7})+\exp(-2\,(3.91796\times 10^{-7}+3)^2)+\left(1-\exp\left(-\frac{2}{3}\,(3.91796\times 10^{-7}+0.351)\right)\right)^2\right)-x$$

Result:

$1.54353 - x$

Plot:



(x from −2.3 to 2.3)

Geometric figure:

line

Alternate forms:

$1.54353 - x$

$9.25774\times 10^{-9}\,(1.66729\times 10^{8} - 1.08018\times 10^{8}\,x)$

Root:

$x \approx 1.54353$

1.54353

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\mathbb{R}$ (all real numbers)

Bijectivity

bijective from its domain to $\mathbb{R}$

$\mathbb{R}$ is the set of real numbers

Derivative:

$$\frac{d}{dx}(1.54353 - x) = -1$$

Indefinite integral:

$$\int\left(\left(\exp(2\,3.91796\times10^{-7}) + \frac{1}{2}\exp(2\times0.0864055\,3.91796\times10^{-7}) + \exp(-2\,(3.91796\times10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times10^{-7}+0.351)\right)\right)^2\right) - x\right)dx = 1.54353\,x - 0.5\,x^2 + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((1.54353 - x) - (1.54353 - x))\,dx = 0$$

x*(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-1.54353

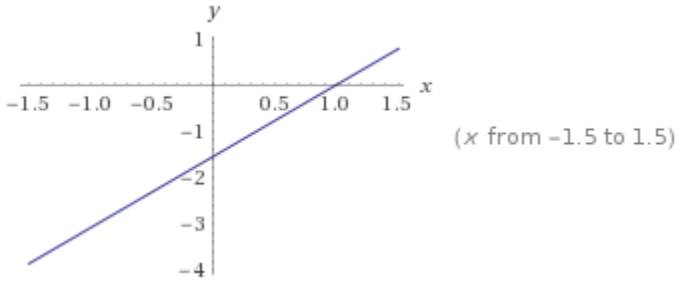
Input interpretation:

$$x\left(\exp(2\times3.91796\times10^{-7}) + \frac{1}{2}\exp(2\times0.0864055\times3.91796\times10^{-7}) + \exp(-2\,(3.91796\times10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times10^{-7}+0.351)\right)\right)^2\right) - 1.54353$$

Result:

$1.54353\,x - 1.54353$

Plot:



(x from −1.5 to 1.5)

Geometric figure:

line

Alternate forms:

$1.54353\,(x - 0.999999)$

$9.25774 \times 10^{-14} \left(1.66729 \times 10^{13}\, x - 1.66729 \times 10^{13}\right)$

Root:

$x \approx 0.999999$

0.999999

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\mathbb{R}$ (all real numbers)

Bijectivity

bijective from its domain to $\mathbb{R}$

$\mathbb{R}$ is the set of real numbers

Derivative:

$$\frac{d}{dx}(1.54353\, x - 1.54353) = 1.54353$$

Indefinite integral:

$$\int \left(x \left(\exp(2\, 3.91796 \times 10^{-7}) + \frac{1}{2} \exp(2 \times 0.0864055\, 3.91796 \times 10^{-7}) + \exp(-2\, (3.91796 \times 10^{-7} + 3)^2) + \left(1 - \exp\left(-\frac{2}{3}\, (3.91796 \times 10^{-7} + 0.351)\right)\right)^2\right) - 1.54353\right) dx = 0.771765\, x^2 - 1.54353\, x + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((-1.54353 + 1.54353\, x) - (-1.54353 + 1.54353\, x))\, dx = 0$$

0.999999*(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-1.54353

Input interpretation:

$$0.999999 \left(\exp(2 \times 3.91796 \times 10^{-7}) + \frac{1}{2} \exp(2 \times 0.0864055 \times 3.91796 \times 10^{-7}) + \exp(-2\, (3.91796 \times 10^{-7} + 3)^2) + \left(1 - \exp\left(-\frac{2}{3}\, (3.91796 \times 10^{-7} + 0.351)\right)\right)^2\right) - 1.54353$$

Result:

$-7.32737\ldots \times 10^{-7}$

-7.32737…*10^{-7} = $V(\varphi)$

We observe that:

1+1/(((-7.32737 × 10^-7 / 3.91796e-7)^2))^1/3

Input interpretation:

$$1+\frac{1}{\sqrt[3]{\left(-\frac{7.32737\times10^{-7}}{3.91796\times10^{-7}}\right)^2}}$$

Result:

1.65878…

1.65878…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4 + 21

where 21 is a Fibonacci number

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737\times10^{-7}\times3.91796\times10^{-7}}}+21$$

Result:

1387.15…

1387.15… result practically equal to the rest mass of Sigma baryon 1387.2

2(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/7+golden ratio

Input interpretation:

$$2\sqrt[7]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}} + \phi$$

ϕ is the golden ratio

Result:

125.4244...

125.4244…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

2(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/7+13+golden ratio^2

where 13 is a Fibonacci number

Input interpretation:

$$2\sqrt[7]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}} + 13 + \phi^2$$

ϕ is the golden ratio

Result:

139.4244...

139.4244…. result practically equal to the rest mass of Pion meson 139.57 MeV

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4+322+47-7

where 322, 47 and 7 are Lucas numbers

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}} + 322 + 47 - 7$$

Result:

1728.15…

1728.15….

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4+322+76+18

where 322, 76 and 18 are Lucas numbers

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}} + 322 + 76 + 18$$

Result:

1782.15…

1782.15… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

On the Ramanujan modular forms applied to the Palumbo-Nardelli model

The Palumbo's model states (Palumbo, 2001, 2005):

$$F = \int_0^{\infty} F_i dF_i \qquad (1)$$

where F denotes the initial energy present at the Big Bang explosion (the explosion of initial black hole) and F_i all the partial waves belonging to F.

In terms of the theory of strings, in (1) F is the mode of a bosonic string having mass equal to zero (graviton) and F_i are the oscillation modes of supersymmetric strings. Then, from the following equations:

$$S_p[X,\gamma] = -\frac{1}{4\pi\alpha'}\int_M d\tau d\sigma(-\gamma)^{1/2}\gamma^{ab}\partial_a X^{\mu}\partial_b X_{\mu},$$

that is the Polyakov action, and

$$S = -\frac{1}{4\pi\alpha'}\int d\sigma d\tau\sqrt{-\gamma}\left[\gamma^{ab}\partial_a X^{\mu}\partial_b X^{\nu} - i\bar{\psi}^{\mu}\Gamma^a\nabla_a\psi^{\nu} - i\bar{\chi}_a\Gamma^b\Gamma^a\psi^{\mu}\left(\partial_b X^{\nu} - \frac{i}{4}\bar{\chi}_b\psi^{\nu}\right)\right]\eta_{\mu\nu},$$

that is the action of the "superstring theory", we obtain:

$$F=\int_0^\infty F_i dF_i \quad \text{->} \quad -\frac{1}{4\pi\alpha'}\int_M d\tau d\sigma\sqrt{-\gamma}\gamma^{ab}\partial_a X^\mu \partial_b X_\mu = \int_0^\infty -\frac{1}{4\pi\alpha'}\int d\sigma d\tau\sqrt{-\gamma}$$

$$\left[\gamma^{ab}\partial_a X^\mu \partial_b X^\nu - i\bar{\psi}^\mu \Gamma^a \nabla_a \psi^\nu - i\bar{\chi}_a \Gamma^b \Gamma^a \psi^\mu \left(\partial_b X^\nu - \frac{i}{4}\bar{\chi}_b \psi^\nu\right)\right]\eta_{\mu\nu}. \quad (2)$$

This equation, for the following equations

$$S=-\frac{1}{8\kappa^2}\int d^{26}X(\partial_\mu h_{\nu\hat{\lambda}}\partial^{\hat{\mu}}h^{\hat{\nu}\hat{\lambda}} - \frac{1}{2}\partial_\mu h^{\hat{\nu}}_{\nu}\partial^{\hat{\mu}}h^{\hat{\lambda}}_{\lambda} + \frac{2}{3}\partial_\mu\tilde{\Phi}\partial^{\hat{\mu}}\tilde{\Phi}),$$

that is the spacetime action concerning an D-brane

$$S_{het}=\frac{1}{2\kappa_{10}^2}\int d^{10}x(-G)^{1/2}e^{-2\Phi}\left[\ R+4\partial_\mu\Phi\partial^\mu\Phi-\frac{1}{2}\left|\tilde{H}_3\right|^2-\frac{\kappa_{10}^2}{g_{10}^2}Tr_v\left(\left|F_2\right|^2\right)\ \right],$$

that is the heterotic string action, can be defined also by

$$-\frac{1}{8\kappa^2}\int d^{26}X\left(\partial_\mu h_{\nu\hat{\lambda}}\partial^{\hat{\mu}}h^{\hat{\nu}\hat{\lambda}} - \frac{1}{2}\partial_\mu h^{\hat{\nu}}_{\nu}\partial^{\hat{\mu}}h^{\hat{\lambda}}_{\lambda} + \frac{2}{3}\partial_\mu\tilde{\Phi}\partial^{\hat{\mu}}\tilde{\Phi}\right)=\int_0^\infty\frac{1}{2\kappa_{10}^2}\int d^{10}x(-G)^{1/2}e^{-2\Phi}$$

$$\left[R+4\partial_\mu\Phi\partial^\mu\Phi-\frac{1}{2}\left|\tilde{H}_3\right|^2-\frac{\kappa_{10}^2}{g_{10}^2}Tr_v\left(\left|F_2\right|^2\right)\right] \qquad (3)$$

and according to

$$S=\int d^{26}x\sqrt{g}\left[-\frac{R}{16\pi G}-\frac{1}{8}g^{\mu\rho}g^{\nu\sigma}Tr\left(G_{\mu\nu}G_{\rho\sigma}\right)f(\phi)-\frac{1}{2}g^{\mu\nu}\partial_\mu\phi\partial_\nu\phi\right]$$

(The Scherck-Schwarz theory, thence the action representing the Virasoro-Shapiro Model to the first order in α' containing photon, graviton and scalar fields described to this equation), we have:

$$-\int d^{26}x\sqrt{g}\left[-\frac{R}{16\pi G}-\frac{1}{8}g^{\mu\rho}g^{\nu\sigma}Tr\left(G_{\mu\nu}G_{\rho\sigma}\right)f\left(\phi\right)-\frac{1}{2}g^{\mu\nu}\partial_{\mu}\phi\partial_{\nu}\phi\right]=\int_{0}^{\infty}\frac{1}{2\kappa_{10}^{2}}\int d^{10}x\left(-G\right)^{1/2}e^{-2\Phi}$$

$$\left[R+4\partial_{\mu}\Phi\partial^{\mu}\Phi-\frac{1}{2}\left|\tilde{H}_{3}\right|^{2}-\frac{k_{10}^{2}}{g_{10}^{2}}Tr_{\nu}\left(\left|F_{2}\right|^{2}\right)\right] \qquad (4)$$

where the sign minus indicates the expansion force: i.e. the Einstein cosmological constant.

With regard the D-branes, the equation that is related to F_i, and thence to the supersymmetric action, according to the following equation

$$S=-\frac{1}{\left(2\pi\alpha'\right)^{2}g_{YM}^{2}}\int d^{10}xTr\left\{\left[-\det\left(\eta_{\mu\nu}+2\pi\alpha'F_{\mu\nu}\right)\right]^{1/2}\right\},$$

that is the Born-Infeld form for the gauge action applies by T-duality to the type I theory, becomes:

$$S=-\frac{1}{\left(2\pi\alpha'\right)^{2}g_{YM}^{2}}\int d^{10}xTr\left\{\left[-\det\left(\eta_{\mu\nu}+2\pi\alpha'F_{\mu\nu}\right)\right]^{1/2}\right\} \qquad (5)$$

while the equation related to F**,** and thence to the bosonic action, according to the following equation

$$S_{Dp} = -\mu_p \int d^{p+1}\xi Tr\left\{e^{-\Phi}\left[-\det\left(G_{ab} + B_{ab} + 2\pi\alpha' F_{ab}\right)\right]^{1/2}\right\},$$

that is the coupling of a D-brane to NS-NS closed string fields, that is the same Dirac-Born-Infeld action as in the bosonic string, becomes:

$$S_{D25} = -\mu_{25} \int d^{26}\xi Tr\left\{e^{-\Phi}\left[-\det\left(G_{ab} + B_{ab} + 2\pi\alpha' F_{ab}\right)\right]^{1/2}\right\}. \qquad (6).$$

Thus, from the parallelism between the Palumbo's model and the string theory, one obtains:

$$-\mu_{25} \int d^{26}\xi Tr\left\{e^{-\Phi}\left[-\det\left(G_{ab} + B_{ab} + 2\pi\alpha' F_{ab}\right)\right]^{1/2}\right\} = \int_0^{\infty} -\frac{1}{\left(2\pi\alpha'\right)^2 g_{YM}^2} \int d^{10}x Tr\left\{\left[-\det\left(\eta_{\mu\nu} + 2\pi\alpha' F_{\mu\nu}\right)\right]^{1/2}\right\} \qquad (7)$$

The Einstein's field equation and the theory of string.

The Einstein's field equation which includes the cosmological constant is:

$$R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R - \lambda g_{\mu\nu} = -8\pi G T_{\mu\nu} \qquad (8)$$

where $R_{\mu\nu}$ is the Ricci tensor, R its trace, λ the cosmological constant, $g_{\mu\nu}$ the metric tensor of the space geometry, G the Newton's gravitational constant and $T_{\mu\nu}$ the tensor representing the properties of energy, matter and momentum.

The left hand-side of (8) represents the gravitational field and, consequently, the warped space-time, while the right hand-side represents the matter, i.e. the sources of the gravitational field.

In string theory the gravity is related to the gravitons which are bosons, whereas the matter is related to fermions. It follows that the left and right hand of (8) may be respectively related to the action of bosonic and of superstrings.

From (4) that describes the parallelism between the Palumbo's model and the theory of string, we may thus write:

$$-\int d^{26}x\sqrt{g}\left[-\frac{R}{16\pi G}-\frac{1}{8}g^{\mu\rho}g^{\nu\sigma}Tr\left(G_{\mu\nu}G_{\rho\sigma}\right)f\left(\phi\right)-\frac{1}{2}g^{\mu\nu}\partial_{\mu}\phi\partial_{\nu}\phi\right]=$$

$$=\int_{0}^{\infty}\frac{1}{2\kappa_{10}^{2}}\int d^{10}x\sqrt{-G}e^{-2\Phi}\left[R+4\partial_{\mu}\Phi\partial^{\mu}\Phi-\frac{1}{2}\left|\tilde{H}_{3}\right|^{2}-\frac{\kappa_{10}^{2}}{g_{10}^{2}}Tr_{\nu}\left(\left|F_{2}\right|^{2}\right)\right] \quad (9)$$

The sign minus in the above equation comes from the inversion of any relationship, like the newtonian one, when one examines it outside the range of its validity.

Let us analyze p. e. the orbits of the gravitational equation F = G x m_1 x m_2/ r^2 , for m_1 = m_2 = m: i.e. F = G m^2/r^2.

for $r^2 > G\ m^2$ F(r) => 0, the orbits are attracted by zero,

for $r^2 = G\ m^2$ F(r) = 1 are constant and equal to 1,

for $r^2 < G\ m^2$ F(r) => the orbits are attracted by infinite.

The point $r^2 = k\ m^2$ is a critical point since a small variation of r implies that the orbits may tend to zero or to infinite.

Moreover, from $F = G \times m^2/r^2$, for ΔF and Δr extremely small, such as inside a black hole or a proton, or, in the case of (9) that represents the perturbation of the quantum dominium of strings, $\Delta F/F = 2\Delta m/m - 2\Delta r/r$, and assuming $\Delta m = 0$ one obtains:

$$\Delta F/F = - 2\Delta r/r \qquad (10)$$

where the sign minus indicates that F decreases when r increases, implying that $0 < \Delta F/F < 1$. Let us examine this relationship outside the above range and indicate F_1 at the distance r, and F_2 at the distance $r + \Delta r$.

- $\Delta F/F > 1 \Rightarrow \Delta F > F \Rightarrow (F_1 - F_2) > F_1 \Rightarrow F_2 < 0$ indicating that F becomes repulsive at the distance $r + \Delta r$.
- $\Delta F/F < 0$, since $F > 0$, $\Rightarrow \Delta F < 0 \Rightarrow (F_1 - F_2) < 0 \Rightarrow F_1 < F_2$ indicating that F decreases when r increases, in other words that the attraction increases with the distance between two masses.

The same holds for Δr, whose analysis indicates that when $\Delta r > r$, F becomes repulsive and increases with the distance between the two masses.

The sign minus that appears in (4) is thus consistent with the (i) observed repulsive forces between quark inside a proton and the corresponding strings, (ii) repulsive force of strings inside a black hole, and (iii) relationship (9) which relates the repulsive actions of bosonic and supersymmetric strings in their extremely narrow dominium.

Now, we note that the number 8, and thence the numbers $64 = 8^2$ and $32 = 2^2 \times 8$, are connected with the "modes" that correspond to the physical vibrations of a superstring by the following Ramanujan function:

$$8=\frac{1}{3}\frac{4\left[antilog\frac{\int_0^{\infty}\frac{\cos\pi txw'}{\cosh\pi x}e^{-\pi x^2w'}dx}{e^{-\frac{\pi^2}{4}w'}\phi_{w'}(itw')}\right]\cdot\frac{\sqrt{142}}{t^2w'}}{\log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4}\right)}+\sqrt{\left(\frac{10+7\sqrt{2}}{4}\right)}\right]}. \quad (11)$$

Furthermore, with regard the number 24 (12 = 24 / 2 and 32 = 24 + 8) they are related to the "modes" that correspond to the physical vibrations of the bosonic strings by the following Ramanujan function:

$$24=\frac{1}{3}\frac{4\left[antilog\frac{\int_0^{\infty}\frac{\cos\pi txw'}{\cosh\pi x}e^{-\pi x^2w'}dx}{e^{-\frac{\pi^2}{4}w'}\phi_{w'}(itw')}\right]\cdot\frac{\sqrt{142}}{t^2w'}}{\log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4}\right)}+\sqrt{\left(\frac{10+7\sqrt{2}}{4}\right)}\right]}. \quad (12)$$

Palumbo (2001) ha proposed a simple model of the birth and of the evolution of the Universe. Palumbo and Nardelli (2005) have compared this model with the theory of the strings, and translated it in terms of the latter obtaining:

$$-\int d^{26}x\sqrt{g}\left[-\frac{R}{16\pi G}-\frac{1}{8}g^{\mu\rho}g^{\nu\sigma}Tr\left(G_{\mu\nu}G_{\rho\sigma}\right)f(\phi)-\frac{1}{2}g^{\mu\nu}\partial_\mu\phi\partial_\nu\phi\right]=$$

$$=\int_0^{\infty}\frac{1}{2\kappa_{10}^2}\int d^{10}x(-G)^{1/2}e^{-2\Phi}\left[R+4\partial_\mu\Phi\partial^\mu\Phi-\frac{1}{2}\left|\tilde{H}_3\right|^2-\frac{\kappa_{10}^2}{g_{10}^2}Tr_\nu\left(\left|F_2\right|^2\right)\right], \quad (13)$$

A general relationship that links bosonic and fermionic strings acting in all natural systems.

It is well-known that the series of Fibonacci's numbers exhibits a fractal character, where the forms repeat their similarity starting from the reduction factor $1/\phi$ = 0,618033 = $\frac{\sqrt{5}-1}{2}$ (Peitgen et al. 1986). Such a factor appears also in the famous fractal Ramanujan identity (Hardy 1927):

$$0{,}618033 = 1/\phi = \frac{\sqrt{5}-1}{2} = R(q) + \frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2}\exp\left(\frac{1}{\sqrt{5}}\int_0^q \frac{f^5(-t)}{f(-t^{1/5})}\frac{dt}{t^{4/5}}\right)}, \qquad (14)$$

and

$$\pi = 2\Phi - \frac{3}{20}\left[R(q) + \frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2}\exp\left(\frac{1}{\sqrt{5}}\int_0^q \frac{f^5(-t)}{f(-t^{1/5})}\frac{dt}{t^{4/5}}\right)}\right], \qquad (15)$$

where

$$\Phi = \frac{\sqrt{5}+1}{2}.$$

Furthermore, we remember that π arises also from the following identities (Ramanujan's paper: "Modular equations and approximations to π" Quarterly Journal of Mathematics, 45 (1914), 350-372.):

$$\pi = \frac{12}{\sqrt{130}} \log\left[\frac{\left(2+\sqrt{5}\right)\left(3+\sqrt{13}\right)}{\sqrt{2}}\right], \qquad (16)$$

and

$$\pi = \frac{24}{\sqrt{142}} \log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4}\right)} + \sqrt{\left(\frac{10+7\sqrt{2}}{4}\right)}\right]. \qquad (17)$$

From (17), we have that

$$24 = \frac{\pi\sqrt{142}}{\log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4}\right)} + \sqrt{\left(\frac{10+7\sqrt{2}}{4}\right)}\right]}. \qquad (18)$$

But π is equal also to

$$\pi = \left[anti\log \frac{\int_0^{\infty} \frac{\cos \pi t x w'}{\cosh \pi x} e^{-\pi x^2 w'} dx}{e^{-\frac{\pi t^2}{4} w'} \phi_{w'}(itw')} \right] \cdot \frac{4}{t^2 w'} \qquad (19)$$

Thence:

$$24 = \frac{4\left[anti\log \frac{\int_0^{\infty} \frac{\cos \pi t x w'}{\cosh \pi x} e^{-\pi x^2 w'} dx}{e^{-\frac{\pi^2}{4} w'} \phi_{w'}(itw')} \right] \cdot \frac{\sqrt{142}}{t^2 w'}}{\log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4} \right)} + \sqrt{\left(\frac{10+7\sqrt{2}}{4} \right)} \right]}. \quad (20)$$

Furthermore, we have the following equation:

$$\frac{24}{\sqrt{142}} \log\left[\sqrt{\left(\frac{10+11\sqrt{2}}{4} \right)} + \sqrt{\left(\frac{10+7\sqrt{2}}{4} \right)} \right] = 2\Phi - \frac{3}{20}\left[R(q) + \frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2} \exp\left(\frac{1}{\sqrt{5}} \int_0^q \frac{f^5(-t)}{f\left(-t^{1/5}\right)} \frac{dt}{t^{4/5}} \right)} \right]$$

(21)

from which we can to obtain both 24 and Φ.

The introduction of (14) and (15) in (13) provides:

$$-\int d^{26}x\sqrt{g}\left[-\frac{R}{16G}\cdot\frac{1}{2\Phi-\frac{3}{20}\left(R(q)+\frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2}\exp\left(\frac{1}{\sqrt{5}}\int_0^q\frac{f^5(-t)}{f\left(-t^{1/5}\right)}\frac{dt}{t^{4/5}}\right)}\right)}-\frac{1}{8}g^{\mu\rho}g^{\nu\sigma}Tr\left(G_{\mu\nu}G_{\rho\sigma}\right)f(\phi)+\right.$$

$$\left.-\frac{1}{2}g^{\mu\nu}\partial_\mu\phi\partial_\nu\phi\right]=\int_0^\infty\frac{R}{\kappa_{11}^2}\cdot 2\Phi-\frac{3}{20}\left[R(q)+\frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2}\exp\left(\frac{1}{\sqrt{5}}\int_0^q\frac{f^5(-t)}{f(-t^{1/5})}\frac{dt}{t^{4/5}}\right)}\right]\cdot$$

$$\int d^{10}x(-G)^{1/2}e^{-2\Phi}\left[R+4\partial_\mu\Phi\partial^\mu\Phi-\frac{1}{2}\left|\tilde{H}_3\right|^2-\frac{\kappa_{11}^2}{2\Phi-\frac{3}{20}\left(R(q)+\frac{\sqrt{5}}{1+\frac{3+\sqrt{5}}{2}\exp\left(\frac{1}{\sqrt{5}}\int_0^q\frac{f^5(-t)}{f(-t^{1/5})}\frac{dt}{t^{4/5}}\right)}\right)}2Rg_{10}^2Tr_\nu\right.$$

$$\left.\left(\left|F_2\right|^2\right)\right], \qquad (22)$$

which is the translation of (13) in the terms of the Theory of the Numbers, specifically the possible connection between the Ramanujan identity and the relationship concerning the Palumbo-Nardelli model.

In the work of Ramanujan, [i.e. the modular functions,] the number 24 (8 x 3) appears repeatedly. This is an example of what mathematicians call magic numbers, which continually appear where we least expect them, for reasons that no one understands. Ramanujan‘s function also appears in string theory. Modular functions are used in the mathematical analysis of Riemann surfaces. Riemann surface theory is relevant to describing the behavior of strings as they move through space-time. When strings

move they maintain a kind of symmetry called "conformal invariance". Conformal invariance (including "scale invariance") is related to the fact that points on the surface of a string's world sheet need not be evaluated in a particular order. As long as all points on the surface are taken into account in any consistent way, the physics should not change. Equations of how strings must behave when moving involve the Ramanujan function. When a string moves in space-time by splitting and recombining a large number of mathematical identities must be satisfied. These are the identities of Ramanujan's modular function. The KSV loop diagrams of interacting strings can be described using modular functions. The "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") has 24 "modes" that correspond to the physical vibrations of a bosonic string. When the Ramanujan function is generalized, 24 is replaced by 8 (8 + 2 = 10) for fermionic strings.

Mathematical connections with some sectors of String Theory

From:

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

From:

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 642, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^}\text{-}6$$

from which:

$$\frac{1}{4096}\,e^{-6C+\phi} = 1.6272016\ldots * 10\text{^}\text{-}6$$

$$0.000244140625\,e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^}\text{-}6$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\,e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625}\,e^{-6C+\phi} = \frac{1}{0.000244140625}\,e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty} 17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}} \times \frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757\ldots$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\,\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\,\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - z_0)^k\,z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\,dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = \mathbf{0.989117352243} = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

The mean between the two results of the above Rogers-Ramanujan continued fractions is 0.97798855285, value very near to the ψ Regge slope 0.979:

Ψ	3	$m_c = 1500$	0.979	−0.09

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

From

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

We have:

$$e^{2C} = \frac{2\xi e^{\frac{\phi}{2}}}{1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}}$$

$$\frac{h^2}{32} = \frac{\xi^7 e^{4\phi}}{\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right)^7} \left[\frac{42}{\xi}\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right) + 5\, T e^{2\phi}\right] . \qquad (2.7)$$

For

$T = \frac{16}{\pi^2}$

$\xi = 1$

we obtain:

(2*e^(0.989117352243/2)) / (1+sqrt(((1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))

Input interpretation:

$$\frac{2\,e^{0.989117352243/2}}{1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}}$$

Result:

0.83941881822... –
1.4311851867... i

Polar coordinates:

$r = 1.65919106525$ (radius), $\theta = -59.607521917°$ (angle)

1.65919106525….. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Series representations:

$$\frac{2\,e^{0.9891173522430000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}} = \frac{2\,e^{0.4945586761215000}}{1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\ \sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{2\,e^{0.9891173522430000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}} = \frac{2\,e^{0.4945586761215000}}{1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{2\,e^{0.9891173522430000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}} = \frac{2\,e^{0.4945586761215000}}{1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}}$$

for $(\text{not}\ (z_0 \in \mathbb{R}\ \text{and}\ -\infty < z_0 \le 0))$

From

$$\frac{h^2}{32} = \frac{\xi^7 e^{4\phi}}{\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right)^7} \left[\frac{42}{\xi}\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right) + 5\, T e^{2\phi}\right]$$

We obtain:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}e^{2\times 0.989117352243}\right)$$

Result:

50.84107889... − 20.34506335... i

Polar coordinates:

$r = 54.76072411$ (radius), $\theta = -21.80979492°$ (angle)

54.76072411…..

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)\right.$$
$$\left.e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=$$
$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\right.\right.$$
$$\left.\left.\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/$$
$$\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)\right.$$
$$\left.e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=$$
$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\right.\right.$$
$$\left.\left.\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/$$
$$\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)\right.$$
$$\left.e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7 =$$
$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\right.\right.$$
$$\left.\left.\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/$$
$$\left(\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$
$$\text{for } (\text{not } (z_0\in\mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

From which:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]*1/34

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}$$
$$\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)\times\frac{1}{34}$$

Result:

1.495325850… −
0.5983842161… i

Polar coordinates:

$r = 1.610609533$ (radius), $\theta = -21.80979492°$ (angle)

1.610609533…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)\right.$$
$$\left.e^{4\times 0.9891173522430000}\right)\Bigg/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$
$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\right.$$
$$\left.\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\Bigg/$$
$$\left(17\,\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Now, we have:

$$e^{2C} = \frac{2\xi\, e^{-\frac{\phi}{2}}}{1+\sqrt{1+\frac{\xi\Lambda}{3}e^{2\phi}}}\,, \tag{2.9}$$

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right)-13\,\Lambda\, e^{2\phi}\right]. \tag{2.10}$$

For:

$\xi = 1$

$\Lambda \simeq \frac{4\pi^2}{25}$

ϕ = 0.989117352243

From

$$e^{2C} = \frac{2\xi e^{-\frac{\phi}{2}}}{1 + \sqrt{1 + \frac{\xi\Lambda}{3} e^{2\phi}}},$$

we obtain:

((2*e^(-0.989117352243/2))) /
((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))

Input interpretation:

$$\frac{2\, e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times 0.989117352243}}}$$

Result:

0.382082347529...

0.382082347529….

Series representations:

$$\frac{2\, e^{-0.9891173522430000/2}}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}} = 2\Bigg/\left(e^{0.4945586761215000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000\,\pi^2}}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$\frac{2\, e^{-0.9891173522430000/2}}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}} = 2\Bigg/\left(e^{0.4945586761215000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000\,\pi^2}}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$\frac{2\,e^{-0.9891173522430000/2}}{1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}} = \frac{2}{e^{0.4945586761215000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

From which:

1+1/(((4((2*e^(-0.989117352243/2))) /
((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))))))))

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}}}$$

Result:

1.65430921270...

1.6543092….. We note that, the result 1.6543092... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Indeed:

$$G_{505} = P^{-1/4}Q^{1/6} = (\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4} \times \left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}} = \left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. □

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots$$

Series representations:

$$1+\frac{1}{4\left(2\,e^{-0.9891173522430000/2}\right)\sqrt{1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}}} =$$

$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}$$

$$\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{4\left(2\,e^{-0.9891173522430000/2}\right)\sqrt{1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}}} =$$

$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}$$

$$\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.9891173522430000/2}\right)}{1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}}}=1+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}e^{0.4945586761215000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4e^{1.978234704486000}\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty < z_0 \le 0))$

And from

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right)-13\,\Lambda\,e^{2\phi}\right].$$

we obtain:

e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))-13*(4Pi^2)/25*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}$$
$$\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)\right)$$

Result:

−0.034547055658…

-0.034547055658…

Series representations:

$$\left(\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Bigg/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right.$$
$$\left.e^{-4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$
$$-\left(\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\pi^2-\right.\right.\right.\right.$$
$$25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)\Big/\left(25\,e^{5.934704113458000}\right.$$
$$\left.\left.\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right.$$
$$\left.e^{-4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$
$$-\left(\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\pi^2-25\,e^{1.978234704486000}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\right)\Big/\left(25\right.\right.$$
$$\left.\left.e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

From which:

47 *1/(((-1/((((((e^(-4*0.989117352243) /
[1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 *
[42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-
13*(4Pi^2)/25*e^(2*0.989117352243))]))))))))

Input interpretation:

$$47\left(-\left(1\Big/1\Big/\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)$$

Result:

1.6237116159...

1.6237116159…. result that is an approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$-\left(47\Big/1\Big/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\Big/\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$

$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$-\left(47 \Big/ 1 \Big/ \left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$
$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-\right.\right.$$
$$25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\right.$$
$$\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$-\left(47 \Big/ 1 \Big/ \left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.-\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$
$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\right.\right.$$
$$\left.\left.\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\right.$$
$$\left.e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

And again:

32((((e^(-4*0.989117352243) /
[1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 *
[42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-
13*(4Pi^2)/25*e^(2*0.989117352243))]])))

Input interpretation:

$$32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)$$

Result:

−1.1055057810...

-1.1055057810….

We note that the result -1.1055057810…. is very near to the value of Cosmological Constant, less 10^{-52} , thence 1.1056, with minus sign

Series representations:

$$\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$
$$-\left(\left(1344\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-\right.\right.\right.$$
$$25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\,e^{5.934704113458000}\right.\right.$$
$$\left.\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\;\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$
$$-\left(\left(1344\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-\right.\right.\right.$$
$$25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\right.\right.$$
$$\left.\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\;\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$
$$-\left(\left(1344\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\right.\right.\right.$$
$$\left.\left.\left.\sqrt{z_0}\;\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\right.\right.$$
$$\left.\left.e^{5.934704113458000}\left(1+\sqrt{z_0}\;\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

And:

-[32((((e^(-4*0.989117352243) /
[1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 *
[42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))-
13*(4Pi^2)/25*e^(2*0.989117352243))])))]^5

Input interpretation:

$$-\left[32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right]^5$$

Result:

1.651220569...

1.651220569…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Series representations:

$$-\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Bigg/$$

$$\left.\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000\,\pi^2}-25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$

$$\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^5\right)\Bigg/$$

$$\left(9\,765\,625\,e^{19.78234704486000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$

$$\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^{35}\right)$$

$$-\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$

$$\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000\,\pi^2}-25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$

$$\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^5\right)\Big/$$

$$\left(9\,765\,625\,e^{19.78234704486000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$

$$\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{35}\right)$$

$$-\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$

$$\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000\,\pi^2}-\right.\right.$$

$$\left.\left.25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^5\right)\Big/$$

$$\left(9\,765\,625\,e^{19.78234704486000}\right.$$

$$\left.\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^{35}\right)$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

We obtain also:

-[32((((e^(-4*0.989117352243) /
[1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 *
[42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))-
13*(4Pi^2)/25*e^(2*0.989117352243))])))]^1/2

Input interpretation:

$$-\sqrt{\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)}$$

Result:

$$-0$$
$$1.0514303501\ldots\, i$$

Polar coordinates:

$r = 1.05143035007$ (radius), $\theta = -90°$ (angle)

1.05143035007

Series representations:

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\;-\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$

$$\left.\left.\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)=-\frac{8}{5}\sqrt{21}$$

$$\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.}$$

$$\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\right.\right.$$

$$\left.\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.$$

$$\left.\left.\left.\left.-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$

$$\left.\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\Big)=-\frac{8}{5}\sqrt{21}$$

$$\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.}$$

$$\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\right.$$

$$\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$

$$\left.\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.$$

$$\left.\left.\left.\left.-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$

$$\left.\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\Big)=$$

$$-\frac{8}{5}\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+\right.\right.}$$

$$\left.\left.25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\right.$$

$$\left(e^{3.956469408972000}\right.$$

$$\left.\left.\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

1 / -[32((((e^(-4*0.989117352243) /
[1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 *
[42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-
13*(4Pi^2)/25*e^(2*0.989117352243))]))))]^1/2

Input interpretation:

$$-\left(1\Big/\left(\sqrt{\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)}\right)\right)$$

Result:

0.95108534763... i

Polar coordinates:

$r = 0.95108534763$ (radius), $\theta = 90°$ (angle)

0.95108534763

We know that the primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index $n_s = 0.965 \pm 0.004$, consistent with the predictions of slow-roll, single-field, inflation.

Thence 0.95108534763 is a result very near to the spectral index n_s , to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}}\approx 0.9568666373$$

Series representations:

$$-\left(1\Big/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\left.-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)\right)=$$

$$-\left(5\Big/\left(8\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)\right)\right)$$

$$-\left(1\Big/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\left.-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)\right)=$$
$$-\left(5\Big/\left(8\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+25\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)\Big/$$
$$\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\right.\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)\right)\right)$$

$$-\left(1\Big/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)-\frac{1}{25}\right.\right.\right.\right.\right.$$

$$\left.\left.\left.(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)\right)=$$

$$-\left(5\Big/\left(8\sqrt{21}\sqrt{\left(\left(25-52\,e^{1.978234704486000\,\pi^2}+25\sqrt{z_0}\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\right.\right.\right.$$

$$\left.\left.\left(e^{3.956469408972000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)\right)$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From the previous expression

$$\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)}$$

= -0.034547055658…

we have also:

1+1/(((4((2*e^(-0.989117352243/2))) /
((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))))) + (-0.034547055658)

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times0.989117352243}}}}-0.034547055658$$

Result:

1.61976215705...

1.61976215705….. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$1+\frac{1}{4\left(2\,e^{-0.9891173522430000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}$$
$$\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{4\left(2\,e^{-0.9891173522430000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}$$
$$\sqrt{\frac{4\,e^{1.978234704486000\,\pi^2}}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000\,\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.9891173522430000/2}\right)}{1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}e^{0.4945586761215000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000\,\pi^2}}{75}-z_0\right)^k z_0^{-k}}{k!}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

From

Properties of Nilpotent Supergravity
E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\;. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\;. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\;.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\;,$$

$$a = \frac{b\gamma}{e} < 0\,, \qquad \gamma = \frac{k}{\sqrt{6}} < 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V = \frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V = \frac{1}{3}\,(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives:

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

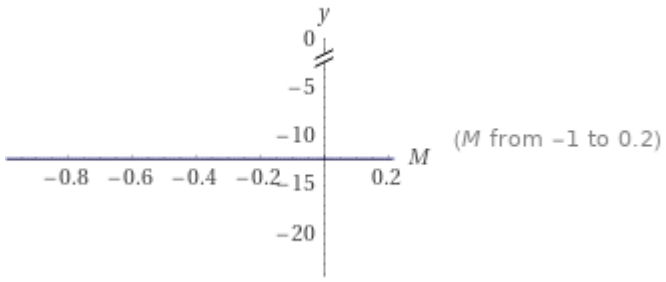
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

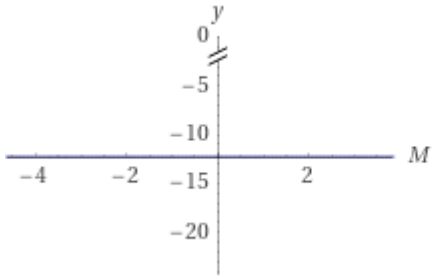
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

from:

Result:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

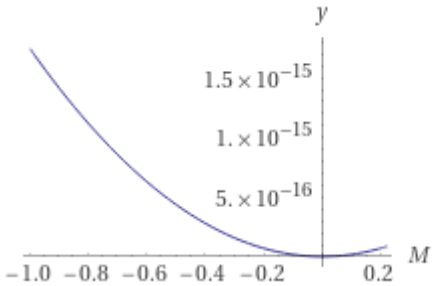
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

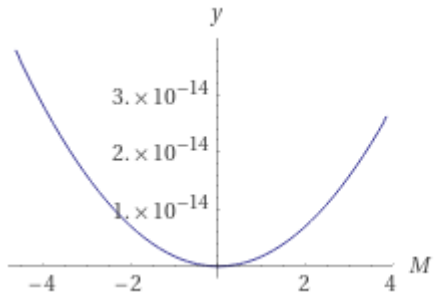
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2(-0.5^2)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 3^2+6.58545\times 10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times 3^2$$

Result:

$$1.579864841810872363256294820161116875\times 10^{-14}$$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots \times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E_P} = \frac{F_P}{q_P} = \sqrt{\frac{c^7}{16\pi^2 \varepsilon_0 \hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_P^E = \mathbf{E_P} l_P^2 = \phi_P l_P = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$\mathbf{E_P * l_P}$ = $(1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$\mathbf{E_P * l_P^2 / l_P}$ = $(5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

Appendix

From:

Lectures on N = 2 String Theory
Doron Gepner
Joseph Henry Laboratories - Princeton University
Princeton, New Jersey 08544- April, 1989

Let us consider now the right moving vector representation. From table 2 the internal dimension for the vector fields is $\bar{\Delta}_i = \frac{1}{2}$ and the charge is $\bar{Q}_i = \pm 1$. Again, these fields obey $\bar{\Delta} = |\bar{Q}|/2$, and are thus chiral or anti–chiral fields of the right moving $N = 2$ algebra with charges ± 1. Denote such a field with $\bar{Q}_i = 1$ by $C = \hat{C}\exp(i\bar{\phi}/\sqrt{3})$, where $\hat{C}$ is a neutral field. The vertex operator for the massless fields in the vector representation of $SO(10)$ is $V_\mu \hat{C}\exp(i\bar{\phi}/\sqrt{3})$, where V_μ, $\mu = 1, 2, \ldots 10$ represents the vector of $SO(10)$ at level one. (V_μ can be taken to be 10 free Majorana fermions.) Acting on this field with the right moving supersymmetry generator $Q^\dagger$ we obtain a massless spinor field, $S_\alpha \hat{C}\exp(-i\bar{\phi}/2\sqrt{3})$, where S_α is the spin field of $SO(10)$. Acting once more with $Q^\dagger$ gives the massless singlet field $\hat{C}\exp(-2i\bar{\phi}/\sqrt{3})$. Counting states we find $10+16+1 = 27$. Indeed these fields together give the 27 representation of E_6. It can be easily checked that the weights of these fields are the correct ones for the 27 of E_6 (as we did for the adjoint), and that this is precisely the vertex operator representation for the 27 of E_6 at level one.

Similarly, the right moving vector fields with $\bar{Q}_i = -1$ give the $\bar{27}$ representation of E_6 when acting with Q twice, $\bar{27} = 10 + \bar{16} + 1$. It can be further seen that these are all the possible fields in the right moving sector of the theory.

How are the right movers in the 27 and $\bar{27}$ representations of E_6 connected together with the right movers? The only possible fields in the right moving sector that these fields can multiply are the spinor and anti–spinor multiplets of $SO(2)$. We thus have four possibilities: space–time left fermions which are 27 ($Q_i = \bar{Q}_i = 1$), right fermions which are 27 ($-Q_i = \bar{Q}_i = 1$), left fermions which are $\bar{27}$ ($Q_i = -\bar{Q}_i = 1$) and right fermions which are $\bar{27}$ ($Q_i = \bar{Q}_i = -1$). The last two are CPT conjugates of the first two ($Q_i \to -Q_i$ along with $\bar{Q}_i \to -\bar{Q}_i$). We conclude that the matter content of the theory consists of a number of left

handed fermions in the 27 of E_6 and a number of left–handed fermions in the $\bar{27}$ of E_6. The 27 fields correspond to left and right chiral fields, (c, c), whereas the $\bar{27}$ correspond to the fields which are left chiral and right anti–chiral, (c, a). In general the number of 27 fields, N_{27} would be different from the number of $\bar{27}$, $N_{\bar{27}}$, giving rise to a net number of chiral generations in the theory, $N = N_{27} - N_{\bar{27}}$.

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